

MEETING SUMMARY

TO: Attendees:
Paul Murphy/BCNP Nick Aumen/ENP Russ Frydenborg/FDEP
Joe Albers/SFWMD Linda Crean/SFWMD Delia Ivanoff/SFWMD
Julianne LaRock/SFWMD Kristin Larson/SFWMD Pam Lehr/SFWMD
Linda Lindstrom/SFWMD Cheol Mo/SFWMD John Moorman/SFWMD
Kevin Nicholas/SFWMD Christy Owens/SFWMD George Paluga/SFWMD
Sherry Scott/SFWMD Bob Stickler/SFWMD Dori Barone/USFWS
Matt Harwell/USFWS Robert Smith/USFWS Donatto Surratt/USFWS
Tiffany Trent/USFWS Mike Waldon/USFWS

CC: Garth Redfield/SFWMD

FROM: Delia Ivanoff
 Pam Lehr

DATE: April 13, 2006

SUBJECT: Marsh Sampling Workshop on February 9, 2006

A 1-day public workshop was held on Thursday, February 9, 2006, at the Skees Road laboratory building and Field Operations Center (FOC) of the South Florida Water Management District (SFWMD or District). This workshop was a follow-up to the previous workshop held at the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) on September 26, 2005. During the morning session, District, Florida Department of Environmental Protection (FDEP), Refuge, U.S. Fish and Wildlife Service (USFWS), and Big Cypress National Park (BCNP) personnel directly involved with marsh water quality sample collection, participated in a hands-on demonstration of sample processing. The sample processing training was led by District Water Quality Monitoring and QA staff Kristin Larson, George Paluga, and John Moorman. All participants were given the opportunity to practice sample processing methods. The group discussion was focused on the status of recommendations for enhanced sample collection methods developed during the September 2005 workshop. The purpose of these workshops was to help ensure collection of representative samples and minimize data variability caused by sampling artifacts. This memorandum presents discussion highlights and action items identified during the workshop. If you have any questions or concerns, please contact Delia Ivanoff (561/682-2681 or divanoff@sfwmd.gov) or Pam Lehr (561/ 682-2473 or plehr@sfwmd.gov).

Next Meeting

Results of this workshop will be presented at the next TOC meeting on February 21, 2006. Delia Ivanoff will schedule another marsh sampling workshop if needed at a future date.

Agenda

An agenda and various handouts were distributed prior to the meeting. The following agenda items were discussed:

- Opening Remarks and Discussion Rules (Juli LaRock)
- Summary of Recent Changes, Planned Improvement Areas, and Other Proposed Changes from Previous Meeting (Delia Ivanoff)
- Group Discussion on Changes, Planned Improvement Areas, and Other Proposed Changes (All)
- Public Comments

Attendees

A total of 23 attendees representing the District, BCNP, Everglades National Park (ENP), FDEP, and USFWS participated in the marsh sampling workshop (Table 1).

Table 1. Contact Information for Marsh Sampling Workshop Attendees (February 9, 2006)

Name	Agency	Phone No.	Email Address	Sample Processing	Discussion
Paul Murphy	BCNP		Paul_murphy@nps.gov	X	X
Nick Aumen	ENP	561/735-6001	Nick_aumen@nps.gov		X
Russ Frydenborg	FDEP	850/245-8063	Russel.frydenborg@dep.state.fl.us	X	X
Joe Albers	SFWMD	561/753-2400, x4764	jalbers@sfwmd.gov		X
Linda Crean	SFWMD	561/753-2400 x4745	lcrean@sfwmd.gov		X
Delia Ivanoff	SFWMD	561/682-2681	divanoff@sfwmd.gov	X	X
Juli LaRock	SFWMD	561/682/6747	jlarock@sfwmd.gov		X
Kristin Larson	SFWMD	561/753-2400, x4757	klarson@sfwmd.gov	X	X
Pam Lehr	SFWMD	561/682-2473	plehr@sfwmd.gov		X
Linda Lindstrom	SFWMD	561/682-6820	llindst@sfwmd.gov		X
Cheol Mo	SFWMD	561/682-2106	cmo@sfwmd.gov		X
John Moorman	SFWMD	561/682-2682	jmoorma@sfwmd.gov	X	X
Kevin Nicholas	SFWMD	561/753-2400, x4763	knichol@sfwmd.gov		X
Christy Owens	SFWMD	561/753-2400 x4650	chowens@sfwmd.gov	X	X
George Paluga	SFWMD	561/753-2400, x4768	gpaluga@sfwmd.gov	X	X
Sherry Scott	SFWMD	561/753-2400, x4674	sscott@sfwmd.gov		X
Bob Stickler	SFWMD	561/753-2400, x4774	rstickle@sfwmd.gov	X	X
Dori Barone	USFWS		dbroglin@fau.edu	X	X
Matt Harwell	USFWS	561/735-6005	matthew_harwell@fws.gov	X	X
Robert Smith	USFWS	561/735-6027	robert_v_smith@fws.gov	X	X
Donatto Surratt	USFWS	561/735-6003	Donatto_surratt@fws.gov	X	X
Tiffany Trent	USFWS	850/723-2921	Tiffany_trent@fws.gov	X	X
Mike Waldon	USFWS	561/735-6006	mike@mwaldon.com		X

Discussion Highlights

Delia summarized the status of improvements in methodology and techniques in collecting marsh water samples (Attachment A) Discussion highlights are presented below.

Recently Implemented Improvements (See Table A-1 in Attachment A)

- **1 (Minimize Helicopter Disturbance):** Samplers are expected to guide the helicopter pilot to an appropriate landing location to minimize disturbance at the target sampling location. “Mud shoes” are effective in enabling samplers to walk in the muck and may be worth exploring in the future. Samplers should use judgment on sampling from the helicopter float if water is deep or sediments are easily disturbed.
- **2 (Discontinue Submersing Capped Bottles):** Uncapping bottles underwater causes unnecessary disturbance. Samplers have switched to uncapping sample bottles before submerging. Entrainment of surface film and particulates can be minimized by holding the inverted bottle, mouth facing down, with the bottle perpendicular to the water surface, immersing it neck opening first to the appropriate depth, and then turning it upright. Surface film should be avoided when retrieving samples.
- **3 (Measure Depth to Consolidated Substrate [DCS]):** George Paluga designed a pole (the “Paluga pole”) to accurately measure the DCS. The prototype was constructed from ¾-inch PVC pipe with a white cap on the bottom and a metric scale (0-150 cm) on the side. The white cap allows the sampler to see when the tip of the pole begins to sink into the sediments. Using the pole, instead of a meter stick, helps in achieving consistency in depth measurements. Holes drilled in the pipe reduce buoyancy and a yellow float attached to the top aid in visibility and retrieval. Additional “Paluga poles” will be fabricated for field sampling teams.
- **4 (Collect Undisturbed Bulk Surface Water Samples):** Regarding the definition of representativeness, the District defers to FDEP’s protocol developed by Frank Nearhoof in 1996. This protocol is referenced in the project monitoring plan for the Refuge. Kristin Larson and John Moorman provided a draft “If, then” table (See Attachment B) to provide additional guidance for samplers. The second person in the sampling team is to confirm each site observation. Site conditions must be documented in detail at each station. Russ Frydenborg/FDEP suggested that it would be a good idea to measure the cause and effect of particles introduced to the Refuge from outside sources that become part of the bulk water flow through the area. Particles that would normally settle out of the bulk water, therefore, should be avoided in the marsh samples. In some cases, small micro-communities in protected areas may be less turbid (and still representative) than large open areas on a windy day. Nick Aumen expressed his concern that sampling teams need sufficient guidance regarding possible situations where the presence of high levels of suspended particles represents the bulk water condition, as described by the Nearhoof protocol. There is the possibility that such conditions represent input of particles from outside sources. Loxahatchee Impoundment Landscape Assessment (LILA) is currently conducting a research study to follow sediments with a tracer dye and model results with the Everglades Landscape Model (ELM). *Nick Aumen provided language in Table B-1 (Attachment B) to guide field staff on when to collect samples when floc is disturbed. Once research data are available, this aspect of the procedure (i.e., collecting samples when particulates are present) can be revisited again.*

- **5 (Enhance Field Documentation):** The standard District field sheet has been revised with additional space for observations. A checklist for typical field observations will also be added as a reference for samplers. Workshop participants agreed that an appropriate level of documentation should be used at all sites and unusual conditions (or lack thereof) should be documented on the field note sheets. It is not practical to document all anticipated conditions in a guidance document. Some conditions typically observed in the Refuge are summarized in Attachment B.
- **6 (Rinse Bottles Prior to Sampling Location):** Russ Frydenborg emphasized that FDEP does not require field rinsing of pre-cleaned bottles and rinsing at the sample location could cause unnecessary disturbance. However, FDEP does not object to field rinsing if disturbance is minimized. The District has changed its procedure for project EVPA from a triple rinse near the sampling location to a single rinse between the helicopter and the sampling location. This procedure should minimize disturbance of the bulk water at the sampling location.
- It should be noted that starting in February 2006, samplers are collecting only 3 liters of water (using a 2-liter and a 1-liter bottle) and filling the 2-liter bottle from the 1-liter bottle.

Improvements Proposed for Immediate Implementation (See Table A-2 in Attachment A)

- **7 (Collect Quarterly Replicates from Marsh Sites):** Russ Frydenborg recommended collecting replicate samples at marsh locations rather than at the canal station. Sample trips are normally arranged to collect samples at locations from the expected lowest to highest concentrations to avoid cross-contamination. Beginning on the next quarterly sampling trip, replicate samples will be collected from a randomly selected marsh station. A replicate may still be collected at a canal site if there is insufficient water in the marsh. S5A is often used as the station where the replicate sample is collected because there is always water at this station. The order in which the stations will be collected in the future will include S5A being sampled last so the replicate sample will only be collected there if it cannot be collected at any other station.
- **8 (Allow Sampling Outside Marked Perimeter):** Sampling has been conducted within the marked perimeter at most stations since the early 90s. Tracks are visible where samplers have repeatedly visited sample stations. From now on, samplers will vary their approach to each station to minimize impacts depending on wind direction and the presence of cattails and tree islands. Samplers should sample at least 10 m from helicopter propeller disturbance and within 50 m of the helicopter. *(Note: The feasibility of using the poles or the helicopter as a point of reference was discussed at length during the workshop and the consensus was to use the distance from the helicopter.)*
- **9 (Demonstrate Capability of Sampling Personnel):** The District currently provides training for samplers and requires inexperienced samplers to work with experienced samplers until they have demonstrated sufficient capability. Further discussion may be

required to define the requirements for “successful demonstration of sufficient capability.” A detailed checklist would facilitate evaluating and documenting capability of newly trained staff. The District will use FDEP’s checklist as a guideline for developing a training checklist.

- **10 (Establish Consistency in Documentation):** A checklist would be helpful for samplers to use in recording field observations. The District will use FDEP’s SOP as a guideline for developing a field observation checklist.
- **11 (Include DCS in DBHYDRO):** DCS is not currently included as a numeric field in DBHYDRO. Total depth is listed but DCS is only noted as text on the field sheets. A request was made to include DCS in the database. A possibility would be to have an additional field included in DBHYDRO. The header sheet and DBHYDRO would have to be revised to accommodate this information and ensure its entry into the database.
- **12 (Conduct Timely Data Review and Analysis):** The District’s protocol is to upload data when results for all analyses are complete. Samples can be re-analyzed if data are received within the 28-day holding period, but it is not practical to schedule a resampling trip with current helicopter and field staff availability. Staff from DOI expressed a concern that for the LOXA program, they are not receiving total phosphorus results within the 28-day holding period; therefore, reanalysis within holding time is not possible. Mike Waldon reported that water quality data were not accessible for samples collected since September 2005. Laboratory staffing shortages could have been the reason for some delays in data reporting. *(Note: The actual problem was determined to be primarily due to delays in publishing the data on the external web browser. This problem has been corrected and data are now available to external users. The District’s contract to conduct laboratory analysis for LOXA samples expires in June 2006.)*

Improvements for Future Consideration (See Table A-3 in Attachment A)

- **F-01 (QC Blank Designation):** The designation of field blanks vs. processing blanks will be evaluated by the District and the procedure will be modified if needed.
- **F-02 (Site Condition Photos):** Nick Aumen clarified this item, as it was his suggestion at the prior workshop. His suggestion for consideration was not for photos, but was that a digital recorder might be used by the sampling crew when detailed field notes are required. Sound files could then be electronically appended to spreadsheets and data sheets. Participants agreed that while field documentation could be enhanced with photographs, digital recordings, and electronic field notes, it is not practical under the harsh field conditions and tight schedule of routine sampling trips. However, an annual site survey could be conducted on a separate helicopter trip; this could be done by the Refuge team. Photos can sometimes be difficult to read, especially if there is a glare on the water surface.

- **F-03 (Provide Additional Field Guidance):** Participants agreed that it was impossible to anticipate all possible field conditions that could be encountered. The District will finalize the “If, then” table in Attachment B and provide a checklist for samplers to use in the field. In addition, new samplers can reference field notes from previous sampling events. Future enhancements could include a glossary of terms and other reference documents. Photos, a list of typical vegetation in the Refuge, and this additional guidance will serve as training tools and reference for the samplers.
- **F-04 (Change Sampling Depth):** Shallow sampling (5-10 cm) was proposed at the September 2005 workshop to avoid disturbing sediments. However, sampling closer to the surface could result in entrapment of surface film or floating particles, which could influence total phosphorus (TP) concentrations. There was also a concern that TP concentrations could vary within the water column and changing the sample depth could have an effect on the data. Participants agreed not to change the sampling depth prior to further study and TOC approval.
- **F-05 (Use Pole Extension for Sampling):** A pole with an attached clamp to facilitate sampling at a distance from the sampler is available commercially. This device could reduce disturbance but could also hamper motion control and visibility. A similar device could be fabricated by adding a clamp to the “Paluga pole.” Russ Frydenborg advised against extending the sample reach by more than 1 ½ to 2 feet. This device may be considered in the future after field trials.
- **F-06 (Filter Samples within 15 Minutes):** Ideally, samples should be filtered within 15 minutes after collection for dissolved constituents. However, it is not practical to conduct field processing while the helicopter is waiting. Some dissolved constituents may be removed from the parameter list. Nick Aumen suggested that a study could be conducted to evaluate the sensitivity of the filtration time on water quality data for dissolved constituents. Russ Frydenborg/FDEP felt strongly about the 15-minute requirement because of the number of variables that can affect dissolved constituents. He felt that the simple test that was proposed might not capture the range of variables and, therefore, could provide misleading data. A separate group is discussing the possibility of dropping some analytes from the list of marsh sampling parameters.
- **F-07 (Install Boardwalks):** The installation of boardwalks at all sample stations was identified for consideration in the September 2005 workshop. However, boardwalks would be expensive and could alter the site conditions by promoting plant growth and attracting wildlife (e.g., birds and alligators). Boardwalks are not recommended for further consideration.

Proposed Studies

The studies proposed during the workshop are summarized in Table 2. These studies are not currently funded but may warrant further consideration by the TOC.

Table 2. Future studies proposed in Marsh Sampling Workshop (February 9, 2006)

Description	Suggested by
Evaluate the fate and transport of floc in bulk water at the Refuge. How far does floc travel and how quickly does it settle under different hydrologic conditions?	Russ Frydenborg
Conduct an annual site survey to document the site conditions at each sample station.	Matt Harwell
Conduct a comparative study of the variability of total phosphorus concentrations with depth.	Matt Harwell
Evaluate the impact of filtration times on dissolved constituents when filtration is conducted at various intervals between 15 minutes and 4 hours.	Nick Aumen

Public Comments

Public comment cards were made available for submittal of public comments during or after the meeting. No public comments were received.

Action Items

The action items identified during the workshop are summarized in Table 3 below.

Table 3. Action Items for Marsh Sampling Workshop (February 9, 2006)

Action Item	Responsibility
Propose revised monitoring plan language to advise samplers on when to sample from pontoons (e.g., deep water, unconsolidated substrate).	Nick Aumen
Provide website link to FDEP sampling SOP for example checklist of field conditions.	Russ Frydenborg
Provide checklist used by FDEP to demonstrate sampler capability.	Russ Frydenborg
Confirm whether or not the lab will analyze a sample if it appears turbid.	Delia Ivanoff
Present the status of marsh sampling workshop recommendations at the next TOC meeting on February 21 st .	Delia Ivanoff
Explore mechanism to add DCS as a field in DBHYDRO.	Julianne LaRock
Add checklist of field conditions in the log book as a reference for samplers.	Kristin Larson
Attach DOI comments to meeting summary for September 26, 2005 workshop and repost on TOC website along with meeting summary for February 9, 2006 workshop.	Cheol Mo
Check on status of water quality updates to XWeb since September 2005.	Cheol Mo
Confirm whether bottle blanks are run for 2-liter bottles.	John Moorman
Order additional "mud shoes" for field personnel.	George Paluga

Attachment A

**Improvements in Methodology and Techniques in
Collecting Marsh Water Samples**

Improvements in Methodology and Techniques in Collecting Marsh Water Samples

Table A-1. Recently implemented improvement areas in marsh sampling collection.

Ref	Category	Issue or modification	Description
1	Sampling Procedure	Minimize disturbance from the helicopter	Sampling lead will actively instruct helicopter pilot where to land (pilot is only responsible for avoiding an unsafe landing location); no disturbance induced by helicopter within 10 meters (m) of sampling location. Under normal conditions, sampling from helicopter pontoons should be done only if depth to consolidated substrate (DCS) > 1 m. Sampling team must use professional judgment in determining if wading is safe, even at shallower water depth. If sampling from pontoon is deemed necessary, pilot must be instructed to <u>ease forward carefully to prevent site disturbance, if sampling from pontoon is deemed necessary.</u>
2	Sampling Procedure	Discontinue the practice of submersing a capped bottle into the water column.	The difficulty of uncapping and using both hands in the water column can cause disturbance of the floc and detrital material. Uncap bottle before submersing into the water column. Entrainment of surface film and particulates can be minimized by holding the inverted bottle with the bottle mouth perpendicular to the water surface and immersing it neck opening first to the <u>appropriate depth and then turning it upright.</u>
3	Sampling Procedure	Implement a consistent method of measuring depth to consolidated substrate (DCS)	Measurement of the DCS can be subjective and difficult to measure consistently. The DCS is an important measurement to justify collection of a small number of samples when it may appear on the surface that there is “a lot of water” in the marsh. A 1 ½ m, ¾-inch diameter PVC pipe with a white tip and holes drilled to minimize buoyancy should be adequate for measuring DCS. The use of a white pipe with white cap also allows the sampler to visualize the contrast against the floc layer.
4	Sampling Procedure	Collect undisturbed samples of the bulk surface water in the marsh.	Follow Nearhoof, et al’s 1996 guidance in determining representativeness. Samples collected must represent the undisturbed bulk surface water. <ol style="list-style-type: none"> 1. Follow all precautions and procedures to prevent disturbance of sampling area. 2. If the Tdepth (depth of the water column) is at least 10 centimeters, a sample of the water column should be collected with minimal disturbance of the floc layer. 3. If an area is disturbed, the field technician should carefully move to another location. 4. Both field technicians must be present at the sampling location for verification purposes, to confirm that the sample was collected without disturbance, verify field conditions, and to record depth readings and physical measurements. 5. Use a 1-liter bottle to fill the 2-liter bottle, and then fill the 1-liter bottle when tdepth is >20cm (implemented in February 2006).

5	Documentation/Data Review	Enhance field documentation.	<ul style="list-style-type: none"> • A new field log sheet was developed to standardize field data entry with additional room for comments. • Document: <ul style="list-style-type: none"> ○ Any unusual conditions must be documented in the field notes (e.g., “no distinguishable water column”). ○ Reasons for deviation from sequence of sampling stations ○ Reason for sampling from helicopter pontoon ○ Observed impacts of sampling from pontoon ○ Clear description of site conditions vs. sample conditions ○ A description of the “visible nature of the water” ○ Type of common plants (e.g., cattails) present ○ Roles of each member of the team in each site
6	Sampling Procedure	Rinse sampling bottle with site water away from the helicopter, prior to reaching the actual sampling location.	Rinsing bottles at the actual sampling location results in site disturbance. Under the present practice, a sampler has to move away from the area where bottle rinsing was done to collect undisturbed samples. The new procedure calls for rinsing the sampling bottle prior to reaching the actual sampling location.

Table A-2. Improvements that need immediate implementation.

Ref	Category	Issue or modification	Description
7	Sampling Procedure	Collection of quarterly replicate samples from the marsh sites	In the past, replicate samples are mostly collected from S5A (canal site). Since the majority of the stations are in the interior marsh, replicate samples should be collected within the marsh. Collect replicates from canal site only if there is no marsh site with enough volume of water for replicate sampling, such as during dry season. Select different marsh stations for quarterly replicate sampling.
8	Sampling Procedure	Do not restrict sampling within the marked perimeter.	Currently, the samplers make every effort to collect sample within the (pole) marked area. There could times and cases when this area might be disturbed. Also, over time, holes in the sediment column are created by the sampler by merely walking through the marsh to the sampling location. Eventually, there may be many holes within the designated perimeter. The sample should make the necessary judgment to sample where it is undisturbed. Allow the sampler to decide on the specific sampling location using GPS coordinates. Sample within approximately 50 meters of the helicopter.
9	Sampling Team	Demonstration of Capability	Only trained personnel, with documented demonstration of capability, should be assigned to collect samples in the marsh. Training must be conducted by someone with demonstrated experience and skills in marsh sampling. The length of time and number of actual on-site training depends on individual's prior experience, as well as his/her ability to acquire the necessary skills and techniques. Demonstration of capability is done through successful performance as determined by the trainer and an auditor, using the following assessment tools: a) visual observation by trainer on-site, b) audit by a designated field auditor, c) evaluation of at least 3 sets of replicates that compares sampling quality of trainer and the personnel being trained, and d) demonstration of ability to make professional judgment.
10	Documentation	Establish consistency in documentation.	Develop and implement the use of a checklist with all the critical elements of marsh documentation.
11	Documentation/ Data Review/Data Analysis	Include depth to consolidated sediment in DBHYDRO database	Currently, this information is entered in field notes, but not supplied in the sample header sheet, nor entered in the database, and is therefore not readily available to data users.
12	Documentation/ Data Review and Data Analysis	Conduct a more timely review and analysis of the data.	There should be a better process to perform data review and data analysis more timely. Field notes and any preliminary data should be verified immediately, as soon as the information is available. Data analysis/assessment should also be done more timely to allow for re-analysis or recollection of samples, if needed. Clarify responsibilities.

Table A-3. Remaining issues and suggestions for further discussion

Ref	Issue or modification	Description	Status
F-01	QC-Blank designation.	Change designation of FCEB to processing blank (PEB), since it is not really collected in the field and the current term could cause confusion. <i>(A comment has been added to the header sheet template stating that the FCEB was processed in the lab.)</i> Add/collect field blanks.	Further discussion (District)
F-02	Pictures of site condition.	Digital sound recorders or cameras could also be used, if available, to record site observations. <i>(Note: This recommendation for digital sound recordings was proposed during the September 2005 workshop but was determined to be impractical during the February 2006 workshop.)</i>	Further discussion
F-03	Provide handy and additional guides to samplers.	Prepare a mini-Quality plan (further clarification needed), field equipment list (existing), and condensed SOP (existing) for reference for use in training and in the field. Include: <ul style="list-style-type: none"> o a table of descriptions of typical marsh conditions to include in field notes. o a matrix of unusual conditions and expectations of the sampler (Table B-1 in Attachment B). o standard description of suspended solids vs. settled material, and sample color, e.g. how to distinguish between color vs. turbidity, relative amounts of particulates. o a list of common plants found in the Refuge for reference in field notes (complete). o Example of old field notes and header sheets o Pictures and videos of the different conditions 	Development underway; further discussion needed
F-04	Change from sampling at mid-depth to sampling 5-10 cm below the surface.	The sampler's effort to collect at mid-depth could cause some disturbance, especially in shallow areas or in areas with thick layer of floc, or dense vegetation. Sampling at 5-10 cm, at which the water column is still visible, could help prevent disturbance of detrital material and floc layer. Alternatively, use smaller collection bottles when not able to work easily in densely vegetated areas.	Further discussion needed
F-05	Use an extension pole to hold the sample bottle when needed.	By using a bottle holder, sampling can be extended up to 1.5 to 2 feet away from where the sampler is positioned and would aid in collecting sample from an undisturbed spot. Avoid use of extension pole in densely vegetated areas.	New suggestion; further discussion needed
F-06	Filter for dissolved analytes within 15 minutes of collection or discontinue collection for those analytes.	Dissolved constituents should be processed within 15 minutes of sample collection for accuracy of phosphorus and nitrogen parameters. Currently, samples are processed in the lab within 4 hours to minimize delays in the field and excessive helicopter charges for standby time.	Further discussion needed
F-07	Install boardwalks.	Consider installing boardwalks (i.e., sampling platforms). This could help minimize disturbance of the site. There are known drawbacks in having boardwalks.	Further discussion needed; may not be feasible or needed at this time

Attachment B
**Field Guidance for the Collection of Marsh Water
Samples**

The following table is intended to provide guidance for the collection of Marsh samples for the EVPA project. This information is not intended to be all inclusive of the entire range of conditions experienced in the field. It should provide enough information to address some of the more common issues encountered by the sampling personnel. The guidelines below are an attempt to equip the sample collection personnel with enough information to collect samples while excluding periphyton and detrital matter that are not a part of the water column.

Table B-1. Field Guidance for the Collection of Marsh Water Samples.

If - Thens for Marsh Sampling

<p>The vegetation cover at interior marsh sample collection stations often varies spatially and temporally. The vegetation cover often limits the availability of suitable gaps large enough to collect water quality samples by hand.</p> <p>The diameter of the gap in the vegetation where the sample is collected should be at least two 1L bottle heights. The 1L bottle is then used to fill the 2L bottle, and is then filled.</p> <ul style="list-style-type: none"> • If a gap is not large enough for the 1L bottle then leave the area to find a gap of sufficient size. • If in the rare instance that a gap is not available for the 1L bottle size, then use a 250 mL bottle to fill the bottles. • If the visibility of the water column is low, then the collector should collect sample using a smaller bottle. • Different methods of collecting samples at each station must be documented in the field notes.
<p>The collector should take depth measurements as they approach the sampling area so that they have a feel for the relative depth of the area; collect sample from area with total depth close to the relative depth of the area.</p>
<p>If using a 60 mL bottle to collect sample (TPO4 only – sample will not be in processing bucket for description), then collector should use a clear plastic disposable beaker to collect a small volume of the sample to document its description, and then discard contents of the beaker.</p>
<p>If the sample collector is unable to collect sample without disturbing detrital material after several attempts, then the other collector should collect the sample; document the collector in the notes if the collector differs from the one listed at the top of the field notes.</p>
<p>If the wind is blowing so hard that there are ripples within the sampling area, collect sample away from the rippled area.</p>
<p>After a thorough search of the area, if there is no clear delineation between the DCS (depth to consolidated substrate) and the total depth, then do not collect sample. In this case, there is no bulk water as defined in the monitoring plan (tdepth < 10 cm). The following language was proposed by Nick Aumen for review: <i>“If after a thorough search of the area, both members of the sampling team agree that suspended solids in the water column are present and represent the bulk water condition at any site, a sample will be collected with appropriate documentation. Additionally, under the same circumstances, the sampling crew should not select an unrepresentative clear water area to sample.”</i></p>
<p>If unsure of how to handle a situation, call and consult the project manager.</p>